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Going beyond GDP with a parsimonious indicator: Inequality-adjusted healthy lifetime income

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Research Area INEPA

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Going Beyond GDP with a Parsimonious Indicator: Inequality-Adjusted Healthy Lifetime Income

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Abstract

Per capita GDP has limited use as a well-being indicator because it does not capture many dimensions that imply a “good life,” such as health and equality of opportunity. However, per capita GDP has the virtues of easy interpretation and can be calculated with manageable data requirements. Against this backdrop, a need exists for a measure of well-being that preserves the advantages of per capita GDP, but also includes health and equality. We propose a new parsimonious indicator to fill this gap and calculate it for 149 countries.

JEL codes: I31, I15, D63, O10, E01.

Keywords: Beyond GDP, Well-Being, Health, Inequality, Human Development, Lifetime Income.

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1. Introduction

Per capita GDP has limited use in measuring well-being. The reasons are well known,² for example, per capita GDP does not capture negative externalities of production, catastrophes raise GDP because of reconstruction efforts, and GDP does not include the quality of the natural environment. Most important—and partly a consequence of these shortcomings—per capita GDP disregards generally desired aspects such as living long and healthy lives and providing wide parts of the population the opportunity to share in the gains of economic prosperity (Fitoussi et al., 2009; Jones and Klenow, 2016; Fan et al., 2018; Lutz et al., 2018).

The following comparison between Germany and Iceland in 2013 illustrates the consequences of these omissions. According to the World Bank (2019), the two countries had comparable levels of GDP per capita (USD42,914 and USD42,372 adjusted for purchasing power). Thus, one would surmise that the typical German was slightly better off than the typical Icelander. However, this misses the point that life expectancy at birth in Germany was 80.49 years at the time, compared with 82.06 years in Iceland. Even when disregarding the intrinsic value of health, this implies that the *lifetime income* of the average Icelander under current conditions (calculated as life expectancy multiplied by GDP per capita) was higher than that of the average German. Similarly, the Gini index of income inequality in Germany stood at 31.1 (expressed in percent) and at 25.4 in Iceland. Considering that income distributions are skewed toward higher incomes, this implies that the median Icelander was likely to be better off financially than the median German even when disregarding differences in lifetime horizons.

Despite the stated problems, per capita GDP does have the virtues of easy interpretation and can be calculated with manageable data requirements. Against this backdrop, a need exists for a measure that combines the advantages of per capita GDP with the virtues of including health and equality. In the following, we propose inequality-adjusted healthy lifetime income (IHLI) as such an indicator. The resulting number, expressed in PPP-adjusted dollars, refers to the amount that a newborn in a certain economy could expect to earn over the years in which she is in good health for the given economic and health conditions and adjusted for the level of inequality.

2. Inequality-Adjusted Healthy Lifetime Income

Several indicators have been proposed to address the problems of per capita GDP as a well-being measure, for example, the Human Development Index (HDI), the Happy Planet Index, Gross National Happiness, and the Better Life Index (ul Haq, 2003; Fan et al., 2018; OECD, 2019; New Economics Foundation, 2019). However, these indices tend to have high data requirements (on issues such as housing, civic engagement, work-life balance, etc.), are often based on subjective evaluations of life satisfaction or happiness via polling a small subset of the population, and often cannot be interpreted because different components with incompatible units of measurement are meshed together to construct an overall index.

Consider the HDI as an example. This indicator's components are income, life expectancy, and education. Because these are measured in different units, an overall index ranging from zero to one must be constructed out of the different components' sub-indices. The resulting index lacks an economic interpretation and has an upper limit by construction. The upper limit implies that further development cannot change the index value appreciably and that well-developed countries tend to cluster at high index values. Thus, at the upper end of the distribution, only marginal differences across countries may be evident in the index value, while the underlying fundamental data on life expectancy, income, and schooling could differ substantially.

² Simon Kuznets, who is credited with the original formulation of GDP, already warned against its use as a welfare measure.

To address the tradeoff of including additional dimensions of economic well-being, while keeping the indicator easy to calculate, easy to interpret, and based on readily available data, we propose the inequality-adjusted healthy lifetime income (IHLI) as a novel measure for economic well-being. This measure consists of the following components: i) GDP per capita adjusted for purchasing power (pppGDPpc) to capture a country’s material living standard, ii) healthy life expectancy at birth (HALE) to capture health-related aspects such as environmental quality and access to high-quality medical facilities, and iii) an inverse measure of the Gini coefficient (1 – Gini) as a proxy for an average person’s opportunities to benefit from economic progress (Sen, 1976). The following straightforward formulation

$$IHLI_i = pppGDPpc_i \times HALE_i \times (1 - Gini_i) \tag{1}$$

is the amount that a newborn in economy *i* could expect to earn over the years in which she is in good health for the given economic and health conditions and adjusted for the level of inequality. Note that the unitary weights of the different components in this formulation follow mathematically from the underlying units of the different components: since the outcome is inequality-adjusted healthy lifetime income, it does not make sense to use a different weighting scheme in equation (1).³

Using the World Bank’s (2019) World Development Indicators on pppGDPpc in international dollars with a base year of 2011, the World Health Organization’s (2019) Global Health Observatory database on HALE in years, and Solt’s (2019) Standardized World Income Inequality Database on the Gini coefficient of disposable income, we calculate this indicator for the year 2010 for all countries for which the necessary data inputs are available. Table 1 in the appendix displays the results, where the first column contains the country’s rank by the IHLI indicator, the second column provides the country name, the third to fifth columns contain the three components of IHLI, and the sixth column contains the value of IHLI.

Interestingly, the IHLI indicator alters some standard rankings based solely on per capita GDP. For example, among high-income countries, the United States and Saudi Arabia exhibit a comparatively low IHLI value despite their high per capita GDP because of rather low values for healthy life expectancy and rather high inequality levels. By contrast, some European countries such as Austria, Belgium, Denmark, and Sweden exhibit a comparatively high IHLI despite their lower per capita GDP because of a rather high healthy life expectancy and a rather low inequality level. While these adjustments seem reasonable, we compare the IHLI with some obvious alternatives: the HDI and its inequality-adjusted version (UNDP, 2017) to assess whether the different well-being indicators yield country rankings that are generally in line with one another. In so doing, we need to restrict the dataset to 120 countries because the inequality-adjusted HDI is only available for this subset.

Figure 1 displays the correlation between the country rankings based on the IHLI and the HDI (left diagram; correlation coefficient: 0.9710) and between the IHLI and the inequality-adjusted HDI (right diagram; correlation coefficient: 0.9536). Altogether, this analysis shows a strong positive correlation between the rankings based on the different indicators, which is reassuring—otherwise we might not measure well-being accurately and might therefore miss important well-being dimensions that the HDI captures. Despite the fact that the different measures lead to consistent country rankings, our proposed indicator has the following advantages:

- It has a direct and immediate economic interpretation.

³ To see this, consider the following analogue. Assume that we would like to calculate the distance travelled by a car within a certain time span. Then we need to multiply the speed of the car by the duration of the travel. Applying a different weight to the speed of the car and the duration of the travel would be meaningless.

- It does not depend on aggregating different sub-indicators that are based on incompatible units of measurement.
- It is not restricted to a value between zero and one and thus is not bounded from above, allowing further development to be measured accurately and avoiding a clustering of countries at the upper bound of the index.
- It is parsimonious in terms of computation and data input requirements.
- It can be obtained for more countries.
- The weights of its components follow directly from the interpretation of the indicator.

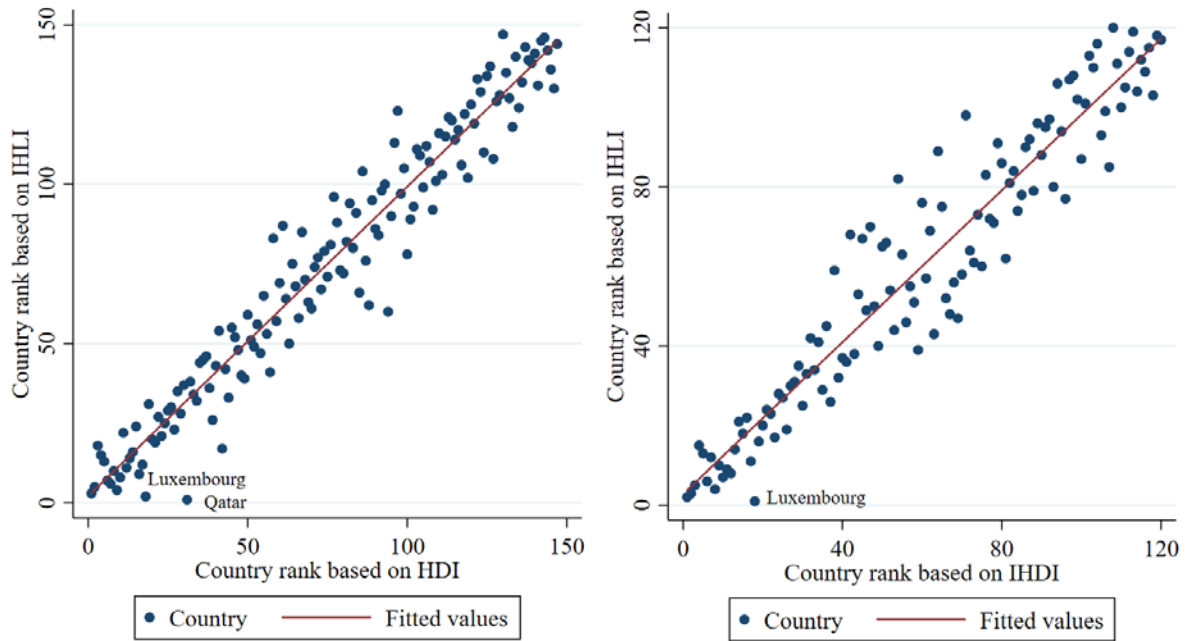


Figure 1. Comparison between IHLI and HDI rankings, 2010 (left diagram: HDI; right diagram: inequality-adjusted HDI)

3. Variants of IHLI

We view the formulation of IHLI in Equation (1) as an important improvement over per capita GDP. However, using gross national income (GNI) per capita instead of GDP per capita to measure income may prove useful because particularly small open economies such as Luxembourg are highly dependent on commuters. In this case, GNI might capture income better than GDP because GNI counts only residents' income. In this case our indicator would change to

$$IHLI_{i,gni} = pppGNIpc_i \times HALE_i \times (1 - Gini_i), \quad (2)$$

where $pppGNIpc$ is the ppp-adjusted GNI and the subscript in the indicator name signifies the use of GNI instead of GDP in the calculation.

Moreover, for some countries and for some time periods, HALE might not be readily available. Another variant of the proposed indicator could thus rely on life expectancy at birth (LEXP) instead of HALE. Life expectancy arguably captures health less well than HALE, but it might be available for more countries and more time periods, which could allow extension of the sample when reconstructing the index over past decades. In this case the indicator would need to be renamed inequality-adjusted lifetime income (ILI) and the formula would change to

$$ILL_i = pppGDPpc_i \times LEXP_i \times (1 - Gini_i). \quad (3)$$

4. Conclusions

We propose a novel indicator for measuring economic well-being that accounts for income, health, and inequality and can be readily interpreted as inequality-adjusted healthy lifetime income. Although this indicator captures more dimensions of well-being than per capita GDP, it nevertheless remains easy to calculate and easy to interpret and requires limited data. A country ranking for the year 2010 shows some reasonable deviations from a ranking based on per capita GDP. While the IHLI-based country rankings are consistent with the rankings based on other established indicators such as the HDI, IHLI does not share HDI's shortcomings and is available for more countries (149 countries instead of 120 as in case of the inequality-adjusted HDI). Different versions of the indicator might be useful to raise the data availability further and to adjust for distortions that are caused by commuting into small open economies. Overall, our proposed indicator might prove useful for a better comparison of well-being across countries and over time.

References

Fan V.Y., Bloom D.E., Ogbuoji O., Prettner K., and Yamey G. (2018). Valuing health as development: going beyond gross domestic product, *The BMJ*, 363: k4371.

Fitoussi J.P., Sen A., and Stiglitz J. (2009). Report by the commission on the measurement of economic performance and social progress. The Commission on the Measurement of Economic Performance and Social Progress. Paris, France.

Jones C.I. and Klenow P.J. (2016). Beyond GDP? Welfare across countries and time. *American Economic Review*, 106(9): 2426–5710.

Lutz, W., Lijadi A.A., Striessnig E., Dimitrova A., and Caldeira Brant de Souza Lima M. (2018). Years of good life (YoGL): a new indicator for assessing sustainable progress. IIASA Working Paper WP-18-007, Laxenburg, Austria.

New Economics Foundation (2019). Happy planet index. Available at <http://happyplanetindex.org/countries> [Accessed on August 18, 2019].

OECD (Organisation for Economic Co-operation and Development) (2019). Better life index. Available at <http://www.oecdbetterlifeindex.org/#/111111111111> [Accessed on August 8, 2019].

Sen (1976). Real National Income. *The Review of Economic Studies*, 43(1): 19–39.

Solt F. (2019). Measuring income inequality across countries and over time: the standardized world income inequality database. SWIID Version 8.1, May 2019. Available at <https://fsolt.org/swiid/> [Accessed on May 20, 2019].

ul Haq M. (2003). The birth of the human development index. In: Readings in human development. Oxford. Available at: https://sites.hks.harvard.edu/cid/events/papers/ulhaq_humandevlopindexchap_030201.pdf.

UNDP (United Nations Development Programme) (2017). Human development reports: data. Available at <http://hdr.undp.org/en/data> [Accessed on May 20, 2019].

World Bank (2019). World development indicators. Available at: <http://datatopics.worldbank.org/world-development-indicators/> [Accessed on May 20, 2019].

World Health Organization (2019). Global health observatory (GHO) data. Available at https://www.who.int/gho/mortality_burden_disease/life_tables/hale/en/ [Accessed on May 20, 2019].

Appendix

Table 1. Ranking of countries according to the IHLI indicator, 2010

| Rank | Country | pppGDPpc | HALE | GINI | IHLI |
|------|-----------------|----------|------|-------|-----------|
| 1 | Qatar | 125,141 | 66.7 | 0.397 | 5,033,177 |
| 2 | Luxembourg | 91,743 | 71.7 | 0.280 | 4,736,156 |
| 3 | Norway | 62,350 | 71.8 | 0.246 | 3,375,477 |
| 4 | Singapore | 72,116 | 74.8 | 0.393 | 3,274,319 |
| 5 | Switzerland | 55,866 | 72.5 | 0.290 | 2,875,718 |
| 6 | Netherlands | 46,102 | 71.4 | 0.265 | 2,419,374 |
| 7 | Denmark | 43,998 | 70.4 | 0.253 | 2,313,825 |
| 8 | Sweden | 42,989 | 71.9 | 0.254 | 2,305,808 |
| 9 | Austria | 43,336 | 71.4 | 0.282 | 2,221,639 |
| 10 | Ireland | 43,515 | 71.5 | 0.298 | 2,184,136 |
| 11 | Belgium | 41,086 | 70.8 | 0.257 | 2,161,300 |
| 12 | Iceland | 40,137 | 72.6 | 0.260 | 2,156,306 |
| 13 | United States | 49,479 | 68.7 | 0.370 | 2,141,511 |
| 14 | Finland | 39,848 | 70.4 | 0.254 | 2,092,760 |
| 15 | Germany | 40,429 | 70.9 | 0.287 | 2,043,741 |
| 16 | Canada | 40,699 | 72.2 | 0.311 | 2,024,622 |
| 17 | Oman | 45,336 | 65.5 | 0.319 | 2,022,228 |
| 18 | Australia | 41,464 | 72.2 | 0.329 | 2,008,775 |
| 19 | France | 36,815 | 72.2 | 0.294 | 1,876,574 |
| 20 | Japan | 35,750 | 73.8 | 0.314 | 1,809,896 |
| 21 | Italy | 36,201 | 72.8 | 0.331 | 1,763,112 |
| 22 | United Kingdom | 36,509 | 71.3 | 0.335 | 1,731,046 |
| 23 | Cyprus | 33,913 | 72.4 | 0.298 | 1,723,636 |
| 24 | New Zealand | 32,119 | 72.0 | 0.319 | 1,574,869 |
| 25 | Spain | 32,507 | 72.9 | 0.337 | 1,571,156 |
| 26 | Saudi Arabia | 45,421 | 64.4 | 0.478 | 1,526,916 |
| 27 | Slovenia | 28,678 | 69.2 | 0.247 | 1,494,361 |
| 28 | Malta | 28,359 | 71.6 | 0.272 | 1,478,194 |
| 29 | Czech Republic | 28,353 | 68.1 | 0.253 | 1,442,334 |
| 30 | Greece | 28,726 | 71.5 | 0.332 | 1,372,015 |
| 31 | Israel | 29,665 | 72.4 | 0.369 | 1,355,242 |
| 32 | Portugal | 27,238 | 70.8 | 0.337 | 1,278,584 |
| 33 | Slovak Republic | 25,159 | 66.8 | 0.257 | 1,248,705 |
| 34 | Bahamas, The | 29,222 | 66.4 | 0.439 | 1,088,531 |
| 35 | Hungary | 22,405 | 65.6 | 0.271 | 1,071,469 |
| 36 | Estonia | 22,741 | 66.7 | 0.323 | 1,026,889 |
| 37 | Croatia | 20,758 | 67.9 | 0.277 | 1,019,027 |
| 38 | Poland | 21,771 | 67.3 | 0.313 | 1,006,568 |
| 39 | Lithuania | 21,071 | 64.5 | 0.335 | 903,772 |
| 40 | Kazakhstan | 20,097 | 60.2 | 0.261 | 894,052 |
| 41 | Malaysia | 21,107 | 65.6 | 0.412 | 814,166 |
| 42 | Seychelles | 20,365 | 64.6 | 0.410 | 776,196 |
| 43 | Belarus | 16,261 | 62.3 | 0.245 | 764,841 |

| | | | | | |
|----|------------------------|--------|------|-------|---------|
| 44 | Romania | 17,469 | 65.2 | 0.331 | 761,983 |
| 45 | Latvia | 18,252 | 64.6 | 0.357 | 758,145 |
| 46 | Argentina | 18,712 | 67.3 | 0.399 | 756,852 |
| 47 | Chile | 19,442 | 68.9 | 0.453 | 732,738 |
| 48 | Iran, Islamic Rep. | 17,943 | 63.9 | 0.382 | 708,566 |
| 49 | Uruguay | 17,082 | 68.0 | 0.393 | 705,093 |
| 50 | Lebanon | 16,452 | 65.2 | 0.348 | 699,371 |
| 51 | Turkey | 17,959 | 64.4 | 0.404 | 689,319 |
| 52 | Venezuela, RB | 16,545 | 65.7 | 0.380 | 673,943 |
| 53 | Bulgaria | 15,283 | 65.7 | 0.332 | 670,746 |
| 54 | Mauritius | 15,938 | 64.5 | 0.366 | 651,770 |
| 55 | Montenegro | 14,038 | 67.1 | 0.312 | 648,082 |
| 56 | Barbados | 16,425 | 66.2 | 0.469 | 577,372 |
| 57 | Panama | 15,629 | 68.3 | 0.473 | 562,537 |
| 58 | Mexico | 15,716 | 66.5 | 0.463 | 561,225 |
| 59 | Algeria | 12,871 | 64.5 | 0.324 | 561,184 |
| 60 | Serbia | 12,688 | 66.2 | 0.339 | 555,208 |
| 61 | Iraq | 12,718 | 59.6 | 0.302 | 529,062 |
| 62 | Thailand | 13,487 | 65.5 | 0.406 | 524,722 |
| 63 | Gabon | 15,356 | 54.8 | 0.393 | 510,789 |
| 64 | Brazil | 14,539 | 64.5 | 0.463 | 503,583 |
| 65 | North Macedonia | 11,355 | 66.5 | 0.347 | 493,099 |
| 66 | Costa Rica | 13,000 | 69.7 | 0.456 | 492,918 |
| 67 | Maldives | 12,006 | 67.6 | 0.400 | 486,943 |
| 68 | Tunisia | 10,436 | 65.1 | 0.377 | 423,271 |
| 69 | St. Lucia | 11,788 | 65.7 | 0.459 | 419,006 |
| 70 | Albania | 9,927 | 66.4 | 0.383 | 406,705 |
| 71 | Jordan | 9,473 | 64.7 | 0.346 | 400,829 |
| 72 | Bosnia and Herzegovina | 9,720 | 66.7 | 0.394 | 392,885 |
| 73 | Dominican Republic | 11,133 | 63.8 | 0.455 | 387,090 |
| 74 | China | 9,526 | 67.6 | 0.430 | 367,049 |
| 75 | Colombia | 10,791 | 65.7 | 0.498 | 355,903 |
| 76 | Ukraine | 7,824 | 62.2 | 0.270 | 355,279 |
| 77 | Egypt, Arab Rep. | 9,859 | 60.0 | 0.404 | 352,555 |
| 78 | Peru | 9,957 | 66.3 | 0.469 | 350,524 |
| 79 | Timor-Leste | 8,861 | 57.3 | 0.314 | 348,289 |
| 80 | Ecuador | 9,352 | 66.8 | 0.443 | 347,978 |
| 81 | Paraguay | 9,801 | 64.5 | 0.463 | 339,455 |
| 82 | Jamaica | 7,999 | 66.1 | 0.409 | 312,489 |
| 83 | Mongolia | 7,709 | 60.2 | 0.333 | 309,526 |
| 84 | Sri Lanka | 8,530 | 66.1 | 0.488 | 288,668 |
| 85 | Botswana | 13,053 | 52.9 | 0.589 | 283,793 |
| 86 | Armenia | 6,703 | 65.2 | 0.360 | 279,696 |
| 87 | Indonesia | 8,433 | 60.4 | 0.456 | 277,104 |
| 88 | Georgia | 6,982 | 64.8 | 0.401 | 270,989 |
| 89 | Fiji | 7,352 | 60.4 | 0.393 | 269,548 |
| 90 | Morocco | 6,443 | 63.5 | 0.398 | 246,306 |

| | | | | | |
|-----|-----------------------|--------|------|-------|---------|
| 91 | South Africa | 11,888 | 50.5 | 0.594 | 243,736 |
| 92 | El Salvador | 6,301 | 64.2 | 0.407 | 239,874 |
| 93 | Bhutan | 6,420 | 58.7 | 0.395 | 227,985 |
| 94 | Guatemala | 6,714 | 62.1 | 0.467 | 222,230 |
| 95 | Samoa | 5,400 | 64.4 | 0.414 | 203,783 |
| 96 | Philippines | 5,597 | 60.6 | 0.416 | 198,074 |
| 97 | Tonga | 4,984 | 63.7 | 0.377 | 197,798 |
| 98 | Cabo Verde | 5,828 | 63.1 | 0.481 | 190,869 |
| 99 | Vietnam | 4,408 | 66.5 | 0.376 | 182,921 |
| 100 | Namibia | 8,461 | 53.4 | 0.600 | 180,724 |
| 101 | Bolivia | 5,407 | 61.0 | 0.453 | 180,431 |
| 102 | Congo, Rep. | 5,186 | 54.2 | 0.422 | 162,476 |
| 103 | Pakistan | 4,284 | 56.2 | 0.342 | 158,406 |
| 104 | Yemen, Rep. | 4,479 | 54.3 | 0.359 | 155,888 |
| 105 | Lao PDR | 4,219 | 56.0 | 0.351 | 153,327 |
| 106 | Moldova | 3,911 | 61.3 | 0.362 | 152,951 |
| 107 | Nicaragua | 4,029 | 65.5 | 0.429 | 150,676 |
| 108 | Myanmar | 3,721 | 56.3 | 0.328 | 140,787 |
| 109 | India | 4,463 | 57.4 | 0.469 | 136,035 |
| 110 | Nigeria | 5,083 | 46.2 | 0.421 | 135,969 |
| 111 | Honduras | 3,971 | 65.5 | 0.498 | 130,576 |
| 112 | Mauritania | 3,317 | 54.5 | 0.358 | 116,058 |
| 113 | Micronesia, Fed. Sts. | 3,298 | 60.3 | 0.417 | 115,929 |
| 114 | Vanuatu | 2,948 | 62.0 | 0.374 | 114,419 |
| 115 | Kyrgyz Republic | 2,790 | 61.1 | 0.341 | 112,346 |
| 116 | Sao Tome and Principe | 2,642 | 59.0 | 0.302 | 108,783 |
| 117 | Bangladesh | 2,443 | 60.7 | 0.339 | 98,009 |
| 118 | Ghana | 3,059 | 54.1 | 0.412 | 97,321 |
| 119 | Cambodia | 2,523 | 58.5 | 0.343 | 96,967 |
| 120 | Senegal | 2,725 | 56.1 | 0.392 | 92,931 |
| 121 | Cameroon | 2,930 | 48.3 | 0.431 | 80,520 |
| 122 | Kenya | 2,476 | 55.5 | 0.442 | 76,677 |
| 123 | Zambia | 3,279 | 50.1 | 0.540 | 75,574 |
| 124 | Nepal | 1,986 | 59.2 | 0.362 | 75,010 |
| 125 | Tajikistan | 2,106 | 62.4 | 0.440 | 73,603 |
| 126 | Côte d'Ivoire | 2,690 | 46.2 | 0.410 | 73,331 |
| 127 | Solomon Islands | 1,871 | 60.6 | 0.419 | 65,888 |
| 128 | Comoros | 2,426 | 54.7 | 0.529 | 62,507 |
| 129 | Afghanistan | 1,694 | 51.6 | 0.302 | 61,004 |
| 130 | Benin | 1,819 | 51.7 | 0.447 | 51,999 |
| 131 | Lesotho | 2,366 | 45.7 | 0.523 | 51,568 |
| 132 | Chad | 1,925 | 45.1 | 0.414 | 50,880 |
| 133 | Guinea | 1,574 | 50.0 | 0.369 | 49,645 |
| 134 | Gambia, The | 1,644 | 52.5 | 0.426 | 49,549 |
| 135 | Madagascar | 1,386 | 55.8 | 0.417 | 45,078 |
| 136 | Uganda | 1,516 | 50.4 | 0.413 | 44,847 |
| 137 | Zimbabwe | 1,738 | 46.7 | 0.453 | 44,396 |

| | | | | | |
|-----|---------------|-------|------|-------|--------|
| 138 | Burkina Faso | 1,423 | 49.7 | 0.396 | 42,728 |
| 139 | Rwanda | 1,368 | 56.2 | 0.472 | 40,597 |
| 140 | Ethiopia | 1,074 | 54.0 | 0.324 | 39,199 |
| 141 | Guinea-Bissau | 1,400 | 48.8 | 0.436 | 38,542 |
| 142 | Togo | 1,226 | 51.1 | 0.421 | 36,285 |
| 143 | Liberia | 1,086 | 51.6 | 0.356 | 36,076 |
| 144 | Sierra Leone | 1,200 | 43.9 | 0.383 | 32,503 |
| 145 | Malawi | 1,033 | 50.4 | 0.435 | 29,415 |
| 146 | Niger | 814 | 49.4 | 0.359 | 25,782 |
| 147 | Mozambique | 918 | 47.6 | 0.440 | 24,464 |
| 148 | Burundi | 726 | 50.3 | 0.368 | 23,082 |
| 149 | Haiti | 1,502 | 32.3 | 0.529 | 22,851 |

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